Wetlands Restoration at Galveston Island State Park: A Multi-Agency Project

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The Stewart Ranch in west Galveston Island included some 1100 acres of tidal salt marsh, mostly smooth cordgrass Spartina alterniflora, in 1930. The adjacent West Bay shallows contained large seagrass beds, probably Halodule wrightii. There were approximately 900 acres of marsh left when the ranch became a state park in 1970. In the early 1990's biologists and fisherman noticed the marsh was rapidly disappearing. By 1994, aerial photographs confirmed there were only 400 acres remaining. Over the last four years, the marsh has continued to disappear, until today there are less than 100 acres. Tidal marshes all along West Bay's south shore are disappearing at an alarming rate, apparently from erosion precipitated by subsidence.

In 1997, biologists from Texas Parks and Wildlife (TPWD) and U.S. Fish and Wildlife Service (FWS) secured a $2.1 million grant package from the National Coastal Wetlands Grant Program utilizing Galveston Bay Estuary Program and Natural Resource Damage Assessment (NRDA) monies as a source for the local match. NRDA funds from the Apex barge spill settlement were awarded by the Trustees representing the Department of the Interior (DOI), National Marine Fisheries Service (NMFS), Texas Natural Resource Conservation Commission (TNRCC), Texas General Land Office (GLO), and TPWD. Also in 1997, a Task Force was assembled to oversee planning for the project. The Task Force is made up of members from TPWD, FWS, NMFS, GLO, U.S. Army Corps of Engineers (COE), TNRCC, Galveston Bay Foundation, and Galveston Bay Estuary Program.

The Task force spent a year collecting and assessing data from recent and historic aerial photographs, geotechnical and bathymetric surveys, and other restoration projects in Texas and Louisiana. Through this process, it was ascertained that subsidence of more than a third of a meter had stressed and weakened the tidal marsh vegetation. The vulnerable smooth cordgrass was then scoured out by waves generated by north and northwest winds, especially during strong cold fronts and winter storms. It was also apparent that spits of coarse sand and shell hash, which once protected coves and bayous, had deepened, and no longer served to trip and weaken incoming waves.

Having reached these conclusions, it was determined that a successful project would have to consist of three primary components, including restoration of substrate at the appropriate elevation for re-establishment of smooth cordgrass, planting to re-establish vegetation quickly, and construction of wave barriers or breaks to protect the new marsh. Restoration of marsh substrate was limited to two options, including hydraulic placement of sediment and building up of "terraces" from native material. Hydraulic placement has the disadvantages of requiring channelization for equipment access, and requiring a substantial borrow area. Terracing was selected for the project because it does not require importing material, it creates a significant amount of marsh edge and habitat diversity,

and is somewhat resistant to changes in relative sea level, as marsh vegetation can move up or down the slopes of the terraces to its optimum elevation.

The firm of Shiner, Moseley and Associates (SMA), of Corpus Christi, was selected to provide engineering services for the project. With SMA on board, options for wave break structures were considered. Rock, broken concrete, and geo-tube breakwaters were evaluated primarily for longevity and cost-effectiveness. Geo-tubes are long tubes made from strong geo-textiles, which are filled in place much like sausages, to form breakwaters, groins, or levees. They have been used in many applications over the last ten years, and are now expected to last more than twenty years. They can be used in water up to a meter deep, and were selected because equipment access is not a significant issue, and because they can be placed and filled at roughly a third the cost of rock or concrete structures.

Working closely with the Task Force, final project design was determined in November, and project drawings and specifications were delivered in December, 1998. As of this conference, TPWD is soliciting and evaluating bids for the construction of the new marsh terraces and protective breakwaters. Breakwaters will protect more than 600 acres of remaining natural marsh, tidal bayous, created wetlands, and shallow open water. Terrace fields will cover 100 to 200 acres depending upon the final contract for construction. The planting of approximately 60,000 single stem and one-gallon pots of smooth cordgrass, along with some marshhay cordgrass S. patens, is scheduled for April, 1999. Test plots totaling up to two acres of Halodule wrightii will be planted in clear protected water.

Aerial photographs will be taken annually for several years to track the spread of vegetation and the natural evolution of the new marsh. Bird and wildlife use will be monitored for a qualitative evaluation of habitat values. It is hoped that in two to three years, the new marsh will provide all of the biological values of its natural predecessor.

The restoration project at Galveston Island State Park should prove a valuable model and inspiration for the restoration of more marshes in West Bay and elsewhere. Already a project at Jumbile Cove has been funded and will be under construction in the near future. Residents of several communities on the island have also expressed interest in more restoration of tidal marshes, realizing their benefits to recreational and commercial fisheries, tourism and the overall health of the Galveston Bay system. For more information, or to volunteer to help with planting, please call either of the authors.